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ROSÆ AMERICANÆ. I.

OBSERVATIONS UPON THE GENUS ROSA IN NORTH AMERICA.

FRANÇOIS CRÉPIN.

To the Editors of the Botanical Gazette:

The preface to the observations on American roses, which it is my intention to contribute from time to time, I shall put in the form of a letter, which will permit me to enter into the subject more easily. Recently I asked whether your excellent journal would grant me the courtesy of its pages to address American botanists upon the roses of their country, thinking that I would reach them better than if I should continue to publish my observations in European journals. You have kindly granted my request, and I hasten to take advantage of it.

In the first place, I would call the attention of your readers to the fact that twenty years ago (1876) I published a monograph of the American roses,[1] in which I gave a résumé of our knowledge at that time. Ten years afterwards the late Sereno Watson published a similar work,[2] but based upon more abundant material than had served for my monograph. This monograph, of incontestible merit and containing contributions to our knowledge, was after all simply a preparation for a complete presen-

[1] "Prodrome d'une monographie des roses américaines," in *Bull. Soc. bot. Belg.* 15:—. 1876.

[2] "A history and revision of the roses of North America," in *Proc. Amer. Acad.* 20:—. 1885.

tation of American roses. Watson did not always seize upon the natural affinities which hold together certain forms, being misled by appearances simply or by a misinterpretation of certain characters. Thus, he separated *R. acicularis* Lindl. into two species, one taking the name *R. Sayi* Schwein.; then later into a third species, *R. Engelmanni*.[3] These three species are actually but three varieties of the same specific type. Also he has recognized as a distinct species *R. Arkansana* Porter, which is perhaps but a variety of *R. blanda* Ait. He has preserved as a separate species *R. lucida* Ehrh., which is indeed but a variety of *R. humilis* Marsh. Finally, he has organized two specific groups under the names *R. Fendleri* Crépin and *R. Woodsii* Lindl., each of which seems to me to be composed of heterogeneous elements. As for his *R. Mexicana*, the few specimens which have been collected scarcely permit me to know whether he has well separated it as a distinct species. In any case it seems to belong to the section CAROLINÆ.

In the preface of his monograph Watson says that if the roses were reduced to their primary types North America would contain but nine species. This proposed condensation indicates that he had not acquired sufficient acquaintance with roses, and that he had formed false conceptions of certain forms. It was to call attention to the errors in Watson's work that I published in 1887 and in 1889 a series of remarks upon American roses.[4]

About the same time, another American student of roses, Mr. G. N. Best, took up the study of American roses, concerning which he has published a number of interesting notes,[5] which deserve to be consulted by all who study the genus.

Thanks to researches and multiplied observations which have been made, the acquaintance with a certain number of species is

[3] Garden and Forest, 1887.

[4] "Nouvelles remarques sur les roses américaines," *ibid.* **26**: —. 1887, and **28**: —. 1889.

[5] Remarks on the group CAROLINÆ of the genus *Rosa*, in *Bull Torr. Bot. Club*, 1887. Remarks on the group CINNAMOMEÆ of the North American Roses, *ibid.* 1890. North American roses; remarks on the characters with classification, in *Jour. Trenton Nat. Hist. Soc.* 1889.

sufficiently complete, and these species are scarcely able to cause confusion, at least to collectors and authors who will take the trouble to consult good descriptions. These species are: *R. setigera* Michx. (*R. rubifolia* R. Br.), *R. Carolina* L., *R. humilis* Marsh. (incl. *R. parviflora* Ehrh. and *R. lucida* Ehrh.), *R. nitida* Willd., *R. foliolosa* Nutt., *R. gymnocarpa* Nutt., and *R. minutifolia* Engelm.

But besides these species there are others less well known, which have frequently given rise to confusion. These latter will be considered especially in the notes sent to the BOTANICAL GAZETTE.

The genus *Rosa* has had the singular fortune of having been studied more than any other genus, and of having had its species become more obscure and less recognizable as the work upon them has multiplied, so that today the study of the genus is dreaded by the great majority of botanists. On account of the chaotic state to which the genus has been reduced by species makers, some students have concluded that there are no established boundaries between the species, and that it is useless to seek for constant characters with which to separate them. For some years I have not ceased to protest against this idea, which is radically false, and contradicts well-observed facts. I will continue to affirm that the true species of the genus *Rosa* are clearly characterized, and as distinct from each other as those of any other genus.

One can attribute the deplorable state of the genus for half a century to two principal causes, *viz.*, the condition of the collected material, and the desire of numerous amateurs and florists to discover a great number of new species in a small territory. In most genera the species are represented in herbaria by individuals more or less numerous all of which usually show the characters necessary for good specific determination, so that one may compare individuals with each other, may distinguish dwarf and giant variations, and may form some adequate conception of the possible modifications by organs due to lack or excess of vigor.

But in *Rosa* this is not the case. The species are represented in herbaria by fragments only, either in flower or in fruit, from which one cannot always obtain all the factors for a just conception. If it had been possible to represent the roses in collections, as has been the case with herbaceous plants, by entire individuals, that is to say by bushes, the recognition of the species would not be in so great uncertainty. To the difficulties resulting from insufficiency of material there are added those which the species makers have accumulated, the "counters of hairs," as they are sometimes called, who have multiplied specific types in a needless fashion.

It is to warn my American confrères against the breaking up of species, and to show them how careful one must be before proposing a new type, that I intend to submit to them some considerations based upon long experience, taking up especially species of the section CINNAMOMEÆ.

Each species may present itself in three conditions of vegetation: an habitual state, which may be called the medium, a dwarf state, and a giant state. It is from the medium state, that is, the most frequent one, that the description of the type is usually drawn. The distinctive characters furnished by this state are put in relief in the diagnoses. The dwarf and giant states, however, present certain characters which do not correspond to these diagnoses, and lead to an inference of the existence of specific forms distinct from those described. This has frequently occurred. The dwarfing or the enlargement in the genus *Rosa* affects the form of the prickles, the dimensions of the leaves, of the flowers, of the fruits, etc.; affecting not only the *ensemble* of a bush, but also different parts of the same bush. Thus a delicate or more or less exhausted axis may give rise to puny floriferous branches with small leaflets and single-flowered inflorescences; while a vigorous axis may give rise to floriferous branches with large leaflets and many-flowered inflorescences. These two kinds of branches, if they be isolated, appear very different from each other, and may give rise to the idea of two varieties or even of two species. It is the dwarfing or enlarge-

ment occurring upon a single bush, however, which deserves special study.

In the section CINNAMOMEÆ the armature of the axes shows three conditions: (1) all the axes may be covered with setaceous prickles, scattered and more or less abundant; (2) scattered prickles may occur only in the lower parts of the axes, being completely wanting in the upper parts, which thus become unarmed; (3) prickles may be borne, as before, upon the lower parts and disappear in the upper parts, where the armature is reduced to the regularly paired prickles upon each leaf. It may happen that in species normally provided with paired prickles, these may not be produced upon certain floriferous branches, as also at the extremity of the stems.

In the first case, in which the axes are completely setigerous, dwarfing has apparently no influence upon the armature; but enlarging produces a diminution in the number of prickles at the extremity of the axes. In the second case, dwarfing produces the appearance of numerous prickles distributed equally over all the axes; while enlarging increases the unarmed appearance. Lastly, in the third case, dwarfing produces the development of numerous prickles equally distributed upon those parts of the axes which are normally without them and introduces an obstacle to the regular arrangement of the paired prickles; while enlarging favors the occurrence of paired prickles upon the extremity of the axis.

These variations in the armature result in specimens of the same species differing much from one another, according as they have been taken from the dwarf or giant bushes, or from the lower or upper parts of the same bush.

Again, dwarfing may produce the curious result of transforming the main stem into flower-bearing branches. These stems, remaining dwarf, instead of terminating in a leaf bud which continues the axis, end in an inflorescence which is more or less many-flowered. These stems are thus transformed into floriferous branches, differing in appearance from the normal floriferous branches, and showing one or two more pairs of leaf-

lets, with leaves and upper stipules more crowded. It is this exceptional state of growth which seems to me to have suggested the establishment of *R. Arkansana* Porter.

In Europe, the pubescence and glandulosity have played a preponderant and excessive part in the separation of species and have led to the establishment of a host of pretended species. These have encumbered the genus to such an extent, that it has become nearly impossible to study it. I do not intend to rule out entirely pubescence and glandulosity as means of distinguishing species, but it is necessary to abandon the idea of using them as distinguishing characters of the first order, and to limit their use to indicating differences of a very secondary value. Many species may be either glabrous or pubescent, glandular or non-glandular; but some are more frequently glabrous, others more frequently pubescent, or more habitually glandular, or more often non-glandular. Finally, there are some species which are glandular with great constancy.

What has just been said with reference to smoothness and pubescence, and a glandular and non-glandular condition, is applicable to the form of the leaf-teeth as well, which in the same species may be simple, double, or glandular-compound.

The form of the floriferous and fructiferous receptacles is also subject to frequent variation in the same species. Certain species, however, have the receptacles habitually rounded, while others have them more or less ovoid or elongated. In the section CINNAMOMEÆ the rounded form is the most common.

An attentive study of the numerous variant forms displayed by different species reveals parallel lines of variation, which are faithfully repeated in the different species. The existence of these parallel variations strengthens the evidence as to the folly of an excessive multiplication of species. I wish to say, in passing, that the fragmentation of species of *Rosa* has had in America an exponent in Rafinesque. This singular naturalist, whom one should never take seriously, has constructed some species which will remain enigmas forever.

In Europe the recognition of true species was retarded for a

long time by the ignorance concerning the existence of hybrids, whose intermediate and vacillating characters often render obscure those of genuine types. At present, however, since the frequent occurrence of hybrids has been demonstrated and the bastard products partly classified, the distinction of species has become more precise and rigorous. It is probably true that American roses do not escape hybridization any more than the European and Asiatic species, and the American botanists must face the duty of discovering the hybrids of their country, for their first recognition ordinarily cannot be made with certainty except in the field. They will have to examine with much attention the more or less intermediate forms which occur where several species grow in company. Perhaps they will discover hybrids between *R. pisocarpa* and *R. Nutkana*, between *R. pisocarpa* and *R. gymnocarpa*, between *R. blanda* and *R. acicularis*, etc. M. Th. A. Brutsin has described a *R. neglecta*, which he considers *R. lucida* × *blanda*.[6] Up to the present, in such herbarium material as I have studied, I have recognized but one form which has seemed to me a hybrid, a form which seems to be *R. Carolina* × *humilis*.

I herewith close this preamble, which may appear long, but which I thought indispensable to enable my American confrères to understand thoroughly my way of looking upon species of the genus *Rosa*.

BRUSSELS, March 5, 1896.

ROSA NUTKANA Presl.

I begin my remarks with this species because it has just been the object of a new specific creation under the name of *R. Macdougali* Holzinger.[7] The description of this supposed new species given by Mr. Holzinger is entirely insufficient, and does not permit even the section to be recognized. Two beautiful specimens that Mr. Coville has kindly sent me[8] have enabled

[6] Vergleichende Flora Wisconsin in *Verhand. d. K. K. Zool.-bot. Gesell. in Wien* **26**: 246. 1877.

[7] BOTANICAL GAZETTE **21**: 36. 1896.

[8] Mr. Coville has also sent to me specimens of *R. blanda*, *R. Fendleri*, *R. Cali-*

me to recognize the plant. It is a variety of *R. Nutkana*, with twigs and floriferous branchlets unarmed (in my two specimens), leaflets pubescent on the principal veins, simple teeth, one-flowered inflorescence, hispid-glandular pedicels, receptacles beset with numerous glandular hairs, and sepals glandular on the back. The author says that the single character of hispid-glandular receptacles permits his new species to be distinguished from all other American types. However, several other American species may have their receptacles as hispid as that of *R. Macdougali*. If Mr. Holzinger had consulted the BOTANICAL GAZETTE of 1894 he would have found that Mr. Merritt Lyndon Fernald had described (p. 335) a variety of *R. Nutkana*, under the name of *hispida*, whose receptacles are strongly hispid-glandular. This variety *hispida* was established upon specimens received by Watson from Rock Creek, Montana, and through C. V. Piper from Pullman, Washington. In 1885 Watson in his monograph alluded to the Rock Creek plant, and was inclined to consider it a variety of *R. Nutkana*. Does the variety *hispida* have leaflets glandular beneath and glandular-compound teeth? I have reason to suppose that it has. In 1890, Mr. Edward L. Greene sent me some undetermined specimens which had been collected at Lake Pend d'Oreille, which proved to be a variety of *R. Nutkana* probably identical with the var. *hispida*. The leaves have become almost glabrous, but are glandular beneath, with glandular-compound teeth, and the pedicels, receptacles and sepals are densely hispid-glandular. In my *Prodromus* of 1876 I have given a history of *R. Nutkana*, which at that time was poorly known. Afterwards, the rich material which I have brought together, and the study which I have made of the plant in cultivation, make me somewhat acquainted with the different variations of this type. They are numerous, and can be grouped in several series, which are parallel with the series of variations produced by other species of the same section. These series

fornica, and *R. gymnocarpa*, cited by Mr. Holzinger in his "Report on a collection of plants made by J. H. Sandberg and assistants in northern Idaho in the year 1892," in Contributions from the U. S. National Herbarium 3:223. 1895.

show us glabrous or pubescent leaves, simple or glandular-compound leaf-teeth, leaves glandular or non-glandular beneath, and the floral organs smooth or hispid-glandular.

Instead of describing at length all these variations, a work reserved perhaps for a monograph, in would seem best to present the characters proposed to distinguish *R. Nutkana* from the neighboring species.

I shall compare it first with *R. blanda*, which it resembles in certain features. The armature, when it is normally developed, is sufficient alone to distinguish the two types. Both, as is the case habitually among the CINNAMOMEÆ, bear numerous ordinarily setaceous[9] prickles below, but in *R. Nutkana* these prickles are accompanied by stouter prickles regularly paired on the leaves, prickles which are entirely lacking in *R. blanda*. The paired prickles of *R. Nutkana*, on the stems especially, are very peculiar and very different from the prickles of other American species of this section, often being thick, triangular in form, and more or less decurrent at base, normally straight and perpendicular to the axis from which they arise. On the branches these paired prickles become less robust, and likewise on the floriferous branches. Watson describes the prickles of *R. Nutkana* as being decurved, and Best says the same. I have examined sufficient material, both wild and cultivated, to be well assured that the prickles belong to the straight type, only exceptionally becoming decurved and hooked, as is the case in European and Asiatic species with prickles of the straight type. But the decurving is simply an accident, and it is this accident which Watson and Best saw. Prickles normally curved and hooked apparently occur in but one American species of the section CINNAMOMEÆ, namely, *R. Californica*.

The paired prickles also distinguish *R. Nutkana* from *R. blanda*, which is absolutely free from them. But if for some reason the paired prickles disappear from certain parts of the axes, it is then necessary to have recourse to other distinctions. Such are

[9] In the variety of *R. Nutkana* which I formerly called *R. Durandii* the setaceous spines are often replaced by pedicellate glands.

not wanting, but they are not as easy of application as those drawn from the prickles. The form of the leaflets, perhaps, may be usefully employed. In *R. Nutkana* the leaflets are oval, more or less rounded at base, with teeth rather open; while those of *R. blanda* are obovate, relatively narrower, more or less attenuate at base, with teeth turned towards the apex. It can be added that the former frequently has glandular-compound teeth, while the latter almost always has simple ones. To judge well the differences I have described it is necessary to compare quite an amount of material of the two species, for fear of being deceived by certain variations of form.

The inflorescence can also be used for a distinction, but should be used only with sufficient material for accurate judgment. The inflorescences of *R. Nutkana* are much more often one-flowered than are those of *R. blanda*. The statistics which I have obtained concerning the inflorescences give the following proportions between the one-flowered and many-flowered inflorescences: for *R. nutkana*, 1.8:1; for *R. blanda*, 1:1.4.[10]

The corolla is notably larger in *R. Nutkana*, and the fructiferous receptacles and akenes are a little larger. The tissue of the fructiferous receptacle at complete maturity is drier and less pulpy than in *R. blanda*. I wish to remark, in passing, that the size of the akenes, from which Mr. Best has obtained the means of distinguishing *R. Carolina* from *R. humilis*, deserves the attention of American botanists. In the section CINNAMOMEÆ it will be found probably that the size of the akenes may be usefully employed as a distinguishing character.

The upper stipules and bracts are habitually much more dilated in *R. Nutkana* than in *R. blanda*.

All of these last characters, resting simply upon a difference in size, certainly are of importance, but unfortunately they very often weary the perplexed observer who cannot compare a sufficient amount of well chosen material.

R. pisocarpa and *R. Californica* have paired prickles, as in *R. Nutkana*. In the former, these prickles, which are straight, are

[10] *Cf.* Remarques sur l'inflorescence des Rosa in *Bull. Soc. bot. Belg.* 34²:—. 1895.

slender and never take the form, at least on the stems and principal branches, of the stout prickles of *R. Nutkana*. In the latter, the paired prickles are more or less curved or hooked, and only exceptionally on the slender axes do they become more or less straight. I shall consider later other characters which separate *R. pisocarpa* and *R. Californica* from *R. Nutkana*.

Let us examine at present the geographical distinction of the latter. In his monograph, Watson says that it occurs along the Pacific coast from Alaska, in 62° lat., to Oregon, and extends eastward into the mountains of Idaho and northern Utah, where the Wahsatch marks its limit. Including the variety *hispida*, its eastern limit is extended into western Montana. From material which I have received, I have recognized the species beyond the limits of the United States in Vancouver island, in the lower valley of the Fraser, along the upper Columbia, also in Alberta. I have received specimens from the island of Sitka, which appear to me to belong to *R. Nutkana*. The material from the island Kodiak, which I have described under the name of *R. Aleutensis*, perhaps is, as Watson thought, a variety of the type of Presl, but before accepting this identification fresh investigation must be made.

Upon this side of the frontiers of the Dominion the species occurs in Washington and Oregon between the Pacific coast and the Rocky mountains. Does it reach California or Nevada? It occurs in the Siskiyou mountains, at the boundary of Oregon and California. Towards the east it extends to the mountains of Idaho and Montana. It is not very rare in Utah in the Great Salt Lake region, from which I have received specimens collected by Jones. In these localities it occurs at an altitude of 8,000 feet. Mr. Porter has sent me two floriferous branches collected by Mr. John Scott, in 1869, in the mountains of Colorado. These branches, reported as *R. Woodsii*, seem to me to belong to *R. Nutkana*. It is altogether likely that the species will be discovered in the mountains of Wyoming. According to the known facts, therefore, *R. Nutkana* has a boreo-occidental distribution.

Rosa blanda Ait.

According to Watson, *R. blanda* extends from Newfoundland to Hudson's Bay, and southward to northern New York, whence it extends to the west as far as Minnesota, traversing Ontario, Michigan, Illinois, and Wisconsin, and appearing again to the north in Manitoba. We have in this a boreo-oriental distribution. In the consideration of *R. Arkansana* a little later we shall see whether this western limit of *R. blanda* should not be extended. Recently, Mr. Holzinger (*loc. cit.*) has pointed out *R. blanda* as occurring in Idaho (valley of Little Potlatch river, no. 381; Lake Cœur d'Alene, no. 581), but no. 581 of the Sandberg collection, of which I have received a beautiful specimen, appears to me to belong well to *R. Nutkana*. Its prickles are paired, its leaflets are pubescent and with simple teeth, its pedicels are ordinarily hispid-glandular, and its sepals are glandular without. As for no. 381 of the same collection, there is not the least doubt that it is *R. Nutkana*, with pubescent leaflets and simple teeth, and pedicels, receptacles and sepals smooth. The corolla is very large.

R. blanda, which often has pubescent leaves, sometimes displays leaves perfectly glabrous; the teeth are almost always simple, and very rarely do they become glandular-compound. Rarely, also, are the leaves a little glandular beneath, and the receptacles hispid-glandular. Different ages may give rise to various series of variations.

Rosa Arkansana Porter.

In my *Nouvelles remarques sur les roses américaines* (1889) I have discussed at length the value of *R. Arkansana*, which I had concluded to consider only a variety of *R. blanda*.

According to the terms of the original description, the name *R. Arkansana* can strictly apply only to the form producing simple stems crowned with a terminal inflorescence. These simple stems, about a foot high, are more or less clothed with scattered, slender, straight and often setaceous prickles; the leaves, which are really cauline leaves, have four or five pairs of leaflets; and the

exterior sepals sometimes bear lateral appendages. The authentic specimens whieh I have received from Mr. Porter have glabrous leaves.

Under the name *R. Arkansana*, Watson has not well included the preceding form, which alone constitutes *R. Arkansana* as it had been described by Mr. Porter, but applies it to tall forms, with stems attaining six feet in height and bearing floriferous branchlets which arise directly from the stem or are borne on the branches.

According to the abundant material which I have brought together in my herbarium under the name *R. Arkansana*, this species does not always have simple stems terminated by a many-flowered inflorescence and more or less setigerous. It may give rise to stems more or less tall and branching. In this case, the entire stem perhaps is clothed with numerous setaceous prickles which completely cover it or the greater part of the floriferous branchlets, which are then as setigerous as those of *R. acicularis*. It remains to be seen whether *R. Arkansana* in the dwarf state or in the tall bushy state may not be sometimes completely unarmed, with its floriferous branchlets entirely bare of prickles as are the upper branches. I have reason to think so. But in the last case what remains to distinguish *R. Arkansana* from *R. blanda?* Nothing seems to remain, for when the former produces floriferous branchlets upon the stem of the second year, or on the branches, these floriferous branchlets do not have four or five pairs of leaflets as in the false floriferous branchlets of *R. Arkansana* as constituted by Mr. Porter, but leaves of only five or seven leaflets, as those of *R. blanda ;* and, on the other hand, I do not see any difference between the normal branches of the two species. Perhaps it can be claimed that in *R. Arkansana* the exterior sepals are a little less rarely appendaged than in *R. blanda.*

It appears, then, that between these two roses there is a simple difference in the degree of abundance of prickles. The leaflets are the same, either glabrous or pubescent, and the floral organs appear to be identical.

Despite the extremely close affinity of these two forms, I think

it prudent to obtain additional information before uniting them. Therefore in the dichotomous table at the end of this paper I have separated *R. Arkansana* as a distinct species, for the purpose of facilitating investigation. It is especially necessary to examine the mode of vegetation of *R. Arkansana*, and to discover the modifications involved in dwarf and giant forms. The cause of the dwarfing, which is quite frequent, should be investigated. Perhaps the frequent fires which ravage the prairie region where *R. Arkansana* appears to occur may have some connection with the dwarfing. It is important to know whether *R. blanda*, more or less typical, does not occur quite frequently associated with *R. Arkansana*, and whether the latter does not gradually pass into the former by a series of intermediate states.

I have specimens of typical *R. Arkansana* from Minnesota, Nebraska, Kansas, Colorado, and Manitoba, and from the Saskatchewan. I have described the plant from the last station under the name *R. blanda* var. *setigera*.

Finally, if *R. Arkansana* is found to be a variety of *R. blanda*, the area of distribution of the latter will be extended chiefly westward.

Rosa pisocarpa A. Gray.

In 1876 (*Prodromus*) I expressed doubts as to the autonomy of *R. pisocarpa* A. Gray. These doubts have been removed by subsequent study of abundant material received from America, and from cultures which I have made. Before entering into the discussion, I wish to remark that Nuttall, who first had recognized the character of *R. gymnocarpa* and *R. foliolosa*, and likewise of *R. Nutkana*, which he had designated in his herbarium as *R. megacarpa*, had taken *R. pisocarpa* for a new species, to which he gave the name *R. arguta* MS. If Torrey and Gray had retained these two names proposed by Nuttall, there would have been two more species to his credit.

In its habitual form, such as Asa Gray described and figured in the *Botanical Magazine* (*pl. 6857*), *R. pisocarpa* cannot be confounded with any other species. Its prickles regularly paired, and its leaflets more or less conspicuously rounded at base, dis-

tinguish it from *R. blanda*. Its slender and straight prickles, and its inflorescence with small and usually numerous flowers, separate it from *R. Nutkana*. Lastly, the form of its prickles, which are straight and not curved or hooked at the tip, permits no confusion with *R. Californica*.

Despite these differences, there is more or less confusion. Thus, specimens of *R. pisocarpa* received from the Siskiyou mountains, Washington, from Mr. Pringle and Mr. Suksdorf, have been reported by Watson as *R. Californica*. This error came from the appearance of the specimens and a too narrow conception of *R. pisocarpa*. They do not always show the small rounded fructiferous receptacles as large as a pea, such as were described by Asa Gray. These receptacles can become notably larger, either strongly constricted at the neck, or ellipsoidal. On the other hand, the leaflets, which are glabrous or pubescent, sometimes show small glands upon the lower surface. In the last case, the teeth either remain simple or become glandular-compound. Among the rich material from Washington sent to me by Mr. Suksdorf, and which I have placed in my herbarium under *R. pisocarpa*, there are forms whose leaflets are more or less attenuate at base, as in *R. blanda*, instead of rounded as in the type. Will the contraction of the lower part of the leaflets necessitate the making of a species distinct from *R. pisocarpa?* This is impossible, for this difference is not to be regarded. Such contraction will always weaken the amount of distinctive characters which separate *R. pisocarpa* and *R. blanda*.

R. pisocarpa seems to be subject to the same variations as are *R. Nutkana* and *R. blanda* from dwarfing and enlarging, and to show very marked differences between specimens from dwarf bushes and those from more vigorous and taller bushes.

The geographical range given to *R. pisocarpa* by Watson seems to me to need extension, and that, too, probably at the expense of the two groups of forms which he has included under the names *R. Fendleri* and *R. Woodsii*. Towards the north Watson does not extend the limit beyond the southern part of British Columbia. Does the species occur farther north? I am

inclined to believe so. Mr. Greene has sent me a small flowering specimen collected by Mr. Bates, in 1882, near Fort Yukon, Alaska, which seems to me to belong to *R. pisocarpa*. However, I do not wish to announce this determination with certainty; but I am certain that it is not *R. acicularis*, which Watson cites from the same locality.

R. pisocarpa passes down the Columbia into Washington and Oregon, penetrates California in the Sacramento valley, and, I am well assured, reaches Nevada City.

It now remains to see whether it does not extend towards the east and south by the Rocky mountain range, as is the case with *R. Nutkana*. In Idaho Mr. Sandberg has collected, on the shores of Lake Pend d'Oreille (no. 871), a form reported by Mr. Holzinger as *R. Californica*, which appears to me to be a variety of *R. pisocarpa*, the same as two other forms obtained by the same collector in Montana (no. 973 and no. 1009) and reported by Mr. Holzinger as *R. Fendleri*. Mr. Greene, also, has obtained from Idaho, near Montpelier, a form which I think should be referred to *R. pisocarpa*. I have from Utah different forms collected by Mr. Jones, among which I think I recognize the type of Gray. Lastly, from Colorado I have received several roses whose specific identity, for want of sufficient material, is perplexing to me; nevertheless I have reason to suppose that *R. pisocarpa* is among them. These forms of Utah and of Colorado for the most part have been referred by Watson to *R. Fendleri* and *R. Woodsii*.

Rosa Fendleri Crépin.

I have given the name *R. Fendleri* to a rose obtained by Fendler in New Mexico. Watson has described under this name plants from a great number of localities, and upon considering the description given in his monograph and the extent of the geographical distribution, one is tempted to believe that he has characterized a good species; but despite long study I am unable to form a clear idea of that specific group. I am tempted to believe that *R. Fendleri* as constituted by Watson is probably an

artificial group formed, in part, at the expense of *R. pisocarpa* and *R. blanda*, and perhaps partly of one or of several other species as yet incompletely known. As for my *R. Fendleri* of New Mexico I have examined too little material to be actually sure that it is an autonomous type.

For elucidating the problem of *R. Fendleri* a number of investigations need to be made. The botanists who explore the vast region of the Rocky mountains should make careful observations as to the appearance of the bushes. They should examine the variations which accompany the dwarf and giant states, and obtain abundant, well-selected material from which to form a trustworthy opinion of the armature of the different axes. In short, in my opinion, *R. Fendleri* remains as an obscure species, not capable of being clearly defined in the dichotomous table which I have added at the close of the paper.

Rosa Woodsii Lindl.

R. Woodsii was established upon a plant cultivated in the Garden of the Horticultural Society of London. It was supposed to have come from the basin of the Missouri. I have authentic specimens in my herbarium, and have seen others in the Lindley herbarium. One perceives how much cultivation ordinarily modifies the appearance of a species, and how much a description drawn from a single cultivated plant can introduce uncertainty when there is an attempt to apply such a description to the wild plant. This is certainly the case with the description of *R. Woodsii*.

I here wish to digress a moment in reference to this. Watson established, within the Cinnamomeæ which he described, two principal divisions. The first is characterized by the prickles all scattered, and includes *R. acicularis*, *R. Sayi*, *R. blanda*, and *R. Arkansana*; the second is distinguished by the paired prickles, and includes *R. Nutkana*, *R. pisocarpa*, *R. Californica*, *R. Fendleri*, and *R. Woodsii*. This last division is subdivided into two groups, one of which has the sepals all entire, and the other with the outer sepals ordinarily having one or several lateral segments. The

last includes only *R. Woodsii.* Certainly the form of the sepals is extremely important in distinguishing species and even sections, but it is necessary that that form be normal and constant. Now in the section CINNAMOMEÆ the sepals are normally entire, and it is only exceptionally that they produce toward the summit small entire and erect appendages. The difference is great between these sepals exceptionally appendaged and those normally producing lateral appendages from the base. It should be mentioned that the exceptional appearance of lateral appendages is not peculiar to *R. Woodsii*, but may occur in almost all of other American CINNAMOMEÆ.

It follows, therefore, that the most distinctive character used by Watson to sustain the autonomy of *R. Woodsii* has no value, or at least a very secondary value. What other characters, therefore, can separate this species from its neighbors? I have not been able to discover them. In 1876 I expressed the opinion that *R. Woodsii* was only a variety of *R. blanda.* Today I would not dare to be so positive, and would reserve my judgment concerning this form. New researches are necessary either to merge it with another species or to establish it as distinct.

The original description of *R. Woodsii* was corrected by Lindley himself in the *Botanical Register* **12**, which contains a beautiful figure of it (*pl. 976*). This figure, drawn from the cultivated plant, of which I have specimens, has glabrous leaflets oboval and attenuate at base as those of *R blanda*, and with simple teeth; perfectly entire sepals, although in my specimens the exterior ones are sometimes laterally appendaged; receptacles sensibly larger than in these same specimens; and lastly, prickles quite regularly paired as well upon the branches as upon the floriferous branchlets, while in my specimens they are generally scattered and paired only beneath a few leaves terminating the branches. Lindley, in his original description, says the prickles are scattered, but become paired toward the "extremities." By "extremities" he doubtless meant the summit of the main branches or leaf-bearing branches. In the corrected description of the *Botanical Register* he declares that they are

scattered. It is important to know whether the prickles are normally scattered or paired, for, in the former case it would make *R. Woodsii* approach *R. blanda*, while in the latter case it would approach *R. pisocarpa*. This observation must be made in the Missouri region, which appears to be the natural habitat of *R. Woodsii*.

Watson identifies *R. Maximiliana* Nees as *R. Woodsii*. I have authentic specimens of that rose obtained by Prince Max. von Wied in the prairies on the banks of the Missouri. Apart from its pubescent leaflets that form shows very close affinity to *R. Woodsii*, with which it certainly seems to be identical. The armature of its axes very much resembles that of specimens of *R. Woodsii* to which I have alluded above, and leaves me without doubt as to the arrangement of the prickles.

In conclusion, *R. Woodsii* of Lindley remains doubtful to me. Perhaps it constitutes a distinct species; perhaps it is but a variety of *R. blanda* or of *R. pisocarpa*. In reference to *R. Woodsii* as constituted by Watson, I believe it is composed of heterogeneous specific elements.

Rosa gratissima Greene.

Mr. Greene described his *R. gratissima* in 1891 in his *Flora Franciscana*, and remarks that it has the look of *R. Californica*. According to Mr. Greene the prickles, which are slender and straight, are paired only upon the vigorous growing shoots.

Upon comparing the descriptions of *R. gratissima* and *R. Californica* given by Mr. Greene, we find that the first is distinguished from the second (1) by its prickles straight and slender, not stout and habitually curved; (2) by its leaves thin and bright green, not firm and dark green, with teeth a little falciform and not open; (3) by the stipules of the cauline leaves strongly denticulate and not entire. From an examination of specimens sent to me by Mr. Greene, undetermined, but with no doubt as to their identity with *R. gratissima*, I would point out (1) that the prickles are slender and straight, abundant and all scattered on two long fragments of stems, less abundant on the

portions of the stem bearing floriferous branchlets where they are also scattered or rarely irregularly paired, also irregularly paired but more often scattered on the floriferous branchlets; (2) that the leaves are thin and bright green, with teeth usually simple and directed somewhat towards the apex; (3) that the stipules of the cauline leaves are quite strongly denticulate, but so also are the upper stipules of the floriferous branchlets and the bracts. But Mr. Greene has not remarked the fact that the upper stipules and bracts are dilated, while those of *R. Californica* remain narrow. This dilatation of stipules and bracts, in my judgment, constitutes an important distinctive character.

I observe, moreover, that the inflorescences are all pluriflorous, with 2 to 5 flowers, that the pedicels are long and slender, quite often a little pubescent, that the pubescence may invade the receptacle, that the sepals may be silky on the back and the exterior ones sometimes furnished above with one or two small very narrow and entire lateral appendages, and, lastly, that the corolla is quite small. Mr. Greene seems to lay stress upon the fragrant glands of the leaves. I would remark, however, that the glandular character of certain varieties of *R. Californica* is more marked and persistent. In *R. gratissima*, as in the forms of *R. pisocarpa* with glandular leaves, the leaf glands are very small, sessile, very abundant on very young leaves and as abundant on the petioles as upon the lower surface of the leaflets; but these glands are fugacious and disappear with age, for the most part quite promptly. In *R. gratissima* these minute glands may also invade the upper surface of the leaflets.

The question suggests itself whether *R. gratissima* constitutes an autonomous specific type, or is an aberrant variety of *R. Californica*. The material which I have received, obtained perhaps from one bush, does not permit me to decide with certainty. Nevertheless, by reason of its dilated upper stipules and bracts, and its straight spines, I consider that *R. gratissima* is specifically distinct from *R. Californica*, and that other characters do not permit it to be a variety of *R. pisocarpa*.

It is important to know whether the character drawn from

the denticulation of the stipules and bracts[11] remains constant on all the bushes or is exceptional. In the second place, an important point to elucidate is the normal disposition of the prickles. Are they normally scattered and only exceptionally paired, or are they regularly paired on bushes more or less vigorous?

If *R. gratissima* constitutes a distinct type, it can be expected to occur with glabrous leaves and glandular-compound leaflet-teeth, and also, perhaps, with pedicels and receptacles hispid-glandular.

ROSA CALIFORNICA Cham. & Schlecht.

R. Californica is a species which occurs extensively throughout California. It seems to be somewhat common there and plays about the same rôle as does *R. canina* in Europe. It ought, therefore, to produce numerous varieties.

Watson groups *R. Californica* with *R. pisocarpa* and *R. Fendleri* in a subdivision characterized by its small flowers, ordinarily in pluriferous inflorescences, and its short and narrow stipules; while he forms with *R. Nutkana* another subdivision distinguished by its large flowers, ordinarily in one-flowered inflorescences, and its dilated stipules. *R. Nutkana* is well distinguished, indeed, by a large corolla, by inflorescences often one-flowered, and by the upper stipules remarkably dilated; but in *R. pisocarpa* the stipules cannot be said to be altogether narrow, and the upper ones, although smaller than those of *R. Nutkana*, are, nevertheless, more dilated than those of the lower and cauline leaves. The same thing is seen in the forms which Watson has described under *R. Fendleri*. In *R. Californica* all the stipules appear to remain narrow, the upper ones becoming no more dilated than the lower, as is the case in *R. spithamæa*. This would suggest an important distinction to be established between the species with upper stipules and bracts dilated, including *R. Nutkana*, *R. pisocarpa*, *R. gratissima*, *R. Fendleri*, *R. Woodsii*, *R. blanda*, and *R. aciculatis*, and those with upper stipules and bracts remaining narrow, including *R. Californica* and *R. spithamæa*. I would call the

[11] An analogous denture is observed sometimes in *R. blanda* and *R. Arkansana*.

special attention of American botanists to these differences, and urge them to see whether they are constant.

The form of the prickles affords a second important distinctive character for *R. Californica*. In that species alone are the prickles curved at the tip or more or less hooked. Watson does well to assign straight or recurved prickles to *R. Nutkana*, *R. Fendleri*, and *R. Woodsii*, but in those species, in my opinion, prickles recurved at the tip are only exceptional.

It is well to consider the regions of the axes where the prickles habitually show their normal form. These regions are ordinarily situated in the middle part of the stems and branches. On the floriferous branchlets, prickles normally recurved or hooked, following the weakness of the axes, may become straight. These variations in the armature, both in the form of the prickles and their arrangement, explain the necessity of judging only from quite large specimens, and the extreme usefulness of being able to observe the whole bush.

The form of the leaflets seems to vary quite widely in *R. Californica*, as well as the teeth, which may be simple or glandular-compound. The base, however, appears to be almost always rounded, and not attenuate or cuneate. The leaflets are almost always pubescent, with the lower surface glandular or not. According to Watson, they very rarely are completely glabrous, and that author cites but a single case, that of specimens obtained by Palmer at San Bernardino. No. 454 of the Palmer collection, representing *R. Californica* of that locality, is made up of specimens taken from several bushes which do not all belong to the same variety or even to the same species. Some have completely glabrous leaves and straight prickles, while others have pubescent leaves and more or less hooked prickles. Engelmann had sent to me specimens of this last form, also from San Bernardino. If the pubescent specimens belong to *R. Californica*, those with glabrous leaves appear to belong to another species. In my *Prodromus*, I have described a variety *glabra* of *R. Californica*, established on a plant cultivated in the Jardin des Plantes, Paris, under the name *R. myriantha* Decaisne, but that plant can

as well be a variety of *R. pisocarpa* with glabrous leaves, and appears to be identical with the *R. pisocarpa* of Nevada City, to which I have already alluded.

Watson attributes to *R. pisocarpa* and *R. Fendleri* globular fructiferous receptacles, and to *R. Californica* ovoid receptacles narrowed above. Even if in the last the receptacles are almost constantly of that form, they may be sometimes globular, as, on the other hand, those of *R. pisocarpa* and *R. Fendleri*, in their turn, may be ovoid and narrowed above. Despite these variations, perhaps we should retain for these species the characters drawn by Watson from the form of the receptacles.

In comparing the diverse varieties which I include under the name *R. Californica*, with prickles curved or more or less hooked, and upper stipules and bracts narrow, one wonders whether several distinct specific types are not included under it, whose characters are not yet well known. For want of sufficiently abundant material I am compelled to reserve my judgment upon this question. I hope that the botanists of California, understanding the interest that attaches to the elucidation of *R. Californica*, will be willing to send to me numerous specimens of that species, obtained from different parts of their country.

Let us examine now the geographical distribution of the species. Watson says that it is found throughout California, ascending the mountains as far as 6,000 feet altitude; that it had been encountered in Oregon and Washington, and perhaps in British Columbia; and existed in western Nevada and extreme northern Lower California. This range traced by Watson seems to me to be incorrect at several points. The specimens which made him include Oregon and Washington in the range belong to *R. pisocarpa*. As for British Columbia, I believe that it is entirely foreign to *R. Californica*. I have received from Nevada a specimen obtained by Mr. Greene from Reno, in the Sierra Nevada, not far from the California boundary. San Diego is the southernmost point from which I have seen specimens. Perhaps towards the south it extends beyond California into Arizona. I have received from Mr. Greene some flowering specimens

obtained by him on Mt. Bill Williams, which have some resemblance to *R. Californica*, but I do not venture to pronounce with certainty as to their specific identity. It is very likely, from the known facts, that *R. Californica* is a species entirely western, peculiar to California, and having the Sierra Nevada as its eastern limit.

If one should believe Mr. Holzinger (*loc. cit.*) the limit of this species should be extended to Idaho, but no. 173 ot the Sandberg collections, reported by that author as *R. Californica*, is *R. Nutkana*, while no. 871 certainly does not belong to *R. Californica*. The specimen which I have received is a vigorous flowering branchlet, with inflorescence 22-flowered. Despite this many-flowered inflorescence and quite a small corolla I am inclined to believe that this specimen is a variety of *R. Nutkana*.

In his *Flora of California* Watson describes a variety of *R. Californica* under the name *ultramontana*. This is passed over in silence in the monograph of the same author, and I do not possess authentic specimens of it. Mr. Jones has distributed, under no. 2455, with the name *R. Californica* var. *ultramontana* Watson, specimens of a form obtained at Salt Lake City, which reasonably agrees with the description of the variety *ultramontana*, but which does not appear in any way to belong to *R. Californica*. It rather seems to be a variety of *R. pisocarpa*.

Rosa spithamæa Watson.

R. spithamæa was established by Watson in 1880, in his *Flora of California*. Later, in his monograph, he did not maintain the species, but reduced it to a variety of *R. Californica*. Perhaps Watson was influenced by the opinion which I had expressed concerning its establishment as a species.[12] Since 1882 I have received some new specimens of that curious rose, and their examination has induced me to think that it can very well be specifically distinct from *R. Californica*. In the valley of the Trinity river, where Mr. Rattan first discovered it, it is ex-

[12] *Cf.* Note sur les recentes découvertes de roses en Amérique, in *Bull. Soc. bot. Belg.* **21**[2]: 146. 1882.

tremely abundant. That botanist wrote to Dr. Engelmann that he had encountered there thousands of plants, that the shrub was habitually but three or four inches high, and that it was only in fertile and shady places that it attained as much as a foot in height. The species seems to preserve its dwarf habit in other localities from which I have specimens.

This extremely reduced stature does not appear to be due to accidental dwarfing, and is very constant, constituting very probably an essential difference from *R. Californica*, which is habitually quite tall. This difference is further emphasized by the fact that the prickles of the former are almost always slender and belong well to the straight type, that the corolla is smaller, and that the receptacles are prominently hispid-glandular, a thing said to be very rare in *R. Californica*, and which, for my part, I have never yet observed.

It appears to me that in *R. spithamæa* the upper stipules and bracts are narrow as in *R. Californica*. This point, nevertheless, must be verified by more abundant material than I have at my disposal.

In *R. pisocarpa*, *R. blanda*, and *R. acicularis*, the stock produces more or less elongated subterranean shoots, which multiply the plants, and quickly transform a single individual into a colony which increases year after year. This very general mode of vegetative propagation among the CINNAMOMEÆ appears in *R. spithamæa*. Does it occur in *R. Californica*? We should be made sure of it.

In his *Flora Franciscana* Mr. Greene describes *R. spithamæa* as a distinct type, and, by the side of it, he establishes a new type under the name *R. Sonomensis*, which seems to be a very nearly allied form. This new species is about a foot high, and is distinguished from *R. spithamæa* by its stipules with auricles truncate and not acuminate; its leaflets broadly oval or almost orbicular, truncate or slightly cordate at base, and not obovate or elliptical and attenuate at base; its inflorescence usually with more numerous flowers; its floriferous receptacles rounded-pyriform, and not ovoid; and its larger sepals.

Not yet having received authentic specimens of *R. Sonomensis* I can only judge of its value by its description. From a careful examination of the specimens of *R. spithamæa* which have come to me, and among them those which have been obtained from Mr. Greene, I am inclined to think that *R. Sonomensis* is but a variety of Watson's species. The future will show whether my supposition is correct or not.

In my *Prodromus* I have spoken of a rose to which I had once given the name *R. Bridgesii*, and which I have merged with *R. Californica*. That rose which I described, and of which I have seen new specimens from the herbaria of Asa Gray, DeCandolle, and the Jardin des Plantes of Paris, may well be specifically identical with *R. spithamæa*. If its identity is recognized, the name *R. Bridgesii* will have to replace *R. spithamæa*.

R. spithamæa is noted by Watson in northern California, in Trinity county, and in the middle of the state at New Alameda and near San Luis Obispo. Mr. Greene notes it in Yuba county, and his *R. Sonomensis* in Sonoma county. To these localities should be added Fresno county, in the Sierra Nevada, where Engelmann obtained the species in a Sequoia forest. I have a specimen obtained by Cuming, but without indication of locality.

Some specimens from San Luis Obispo, which I have seen in the herbarium of Asa Gray, often show numerous glandular-tipped bristles in the intervals between the pairs of paired prickles. It should be remarked that these bristles also appear (but rarely) in *R. Californica*. There is reason to believe that *R. spithamæa* will be discovered in other localities. Perhaps the species is exclusively Californian.

ROSA ACICULARIS Lindl.

The American *R. aciculariis* has been long confused among the varieties of *R. blanda*. Borrer, in 1833, in the first volume of Hooker's *Flora Boreali-Americana*, had been on the point of separating it from *R. blanda*. According to Watson, Schweinitz had described this rose in 1825 under the name of *R. Sayi*. In 1876

(*Prodromus*) I described *R. acicularis* Lindl. under its variety *Bourgeauiana* (*R. Bourgeauiana* Crép. at first).

In his monograph, Watson described an arctic form under the name *R. acicularis* Lindl. taking up a second species under the name *R. Sayi*, to which he referred my variety *Bourgeauiana*. According to this author this second species extends less northward than the first. Under these two names are there really two distinct species? I do not think so. It appears to me almost incontestable that the differences used by Watson to separate his *R. acicularis* from *R. Sayi* are not constant, and hence without true value.

In describing his *R. acicularis* of the arctic zone, he seems to try to bring together as near as possible the American form with the form of the old world in attributing to it leaves of five leaflets, elongated receptacles, leaflets mostly with simple teeth and not glandular beneath, and entire sepals. I have not seen specimens from Alaska, but I have received some obtained from Fort Simpson, along the Pelly River, in 63° lat., and in the upper part of the Liard River, in 60° 30′ lat. These specimens show leaves of five to seven leaflets, leaflets glandular beneath and with glandular-compound teeth, sepals all entire or the exterior ones provided with one or two lateral appendages, and fructiferous receptacles globular or elongated-ovoid. I have reason to suppose that the Alaskan form is not different from those to which I have just alluded. As for *R. Sayi*, to which Watson attributes globular fructiferous receptacles and appendaged exterior sepals, it almost always occurs with entire sepals, and if the receptacles are often globular they are not very rarely oblong-ovoid. It is a variety of *R. Sayi* with elongated receptacles which has served Watson for the establishment of his *R. Engelmanni*.[13]

There is no doubt in my mind that under the names *R. acicularis* Lindl. sec. Wats., *R. Sayi* Schwein., and *R. Engelmanni* Wats. there exists only a single and unique type,

[13] *Cf.* Observations on *Rosa Engelmanni* Watson, in *Bull. Soc. bot. Belg.* **28**[2]: 93-95.

to which I gave the name, as above, of the American *R. acicularis*.

It now remains to examine whether this ought to be merged specifically as a variety of *R. acicularis* of the Old World. As early as 1876 I expressed doubts as to the complete specific identity of these two roses. Today I am not disinclined to separate them from each other, and to consider them as two distinct species, although very closely related. The characters which separate them seem important and constant enough to justify their separation. Thus, the American *R. acicularis* has the average leaves of the floriferous branchlets normally of seven leaflets rather than five; its leaflets almost always, if not always, glandular beneath, with teeth glandular, apparently simple or glandular-compound; while in *R. acicularis* of the Old World the leaves have five leaflets, which are always eglandular beneath and with simple teeth. Besides, in the American rose the auricles of the upper stipules are not so long and of a little different form, the inflorescences are less rarely pluriflorous, and the receptacles are habitually less elongated. It is probable that a more searching study will reveal other distinctive characters.

Whether this is the case, is a problem which ought to exercise the sagacity of rhodologists. If the distinction proposed is confirmed, the name *R. acicularis* Lindl. should be retained for the Old World plant, and the American *R. acicularis* should take the name *R. Sayi*, provided the description of Schweinitz applies, as Watson thought, to the rose in question.

Another question to consider is the distinction between the American *R. acicularis* and *R. blanda* and *R. Arkansana*. There are certainly some essential differences between the first and the other two, but these differences sometimes are not such as to make confusion impossible, especially when *R. blanda* and *R. Arkansana* become very setigerous. In the American *R. acicularis* all the axes, from the stem to the floriferous branchlets, are covered with abundant setaceous prickles or bristles. In *R. blanda* it is habitually only the lower part of the stem which is setigerous, the branches and the floriferous branchlets being

unarmed. In this case it is easy to distinguish the two species; but if *R. blanda* increases its armature by extending it to the middle regions of the bush, and even to certain floriferous branchlets; or one finds *R. Arkansana* with axes completely setigerous, then recourse must be had to other characters. Those taken from the leaves are most practical. The leaves of *R. acicularis* are oval, rounded at base, almost always glandular beneath, with open teeth, margins glandular-denticulate or provided with glands; while those of *R. blanda* and *R. Arkansana* are oboval, relatively narrower, quite strongly attenuate or cuneate at base, very rarely glandular beneath, with teeth almost always perfectly simple and directed towards the apex. The form of the stipules is a little different in *R. acicularis*. The inflorescences are much more frequently one-flowered in *R. acicularis* than in *R. blanda* and *R. Arkansana*. The statistics that I have obtained show that the one-flowered inflorescences are to the many-flowered inflorescences as 3.4 to 1 in *R. acicularis;* while in *R. blanda* they are as 1 to 1.4, and in *R. Arkansana* as 1 to 1.6. Lastly, the fructiferous pedicels of *R. acicularis* are more slender, less rigid, and often have a tendency to become incurved, instead of remaining straight.

As to its geographical range the American *R. acicularis* occupies a very considerable area. In latitude it extends from the neighborhood of the polar circle to 38° in the Rocky mountains of Colorado. In longitude it embraces almost all of the continent within the Dominion. To the south it has been observed in Michigan, Wisconsin on the borders of Lake Michigan, and in Minnesota on the borders of Lake Superior. I have received specimens obtained by Messrs. Greene and Kelsey from Helena, Montana, and by Mr. Coulter from the Teton region in Idaho. It is likely that it exists here and there in the Rocky mountains from the borders of Canada to Colorado, where it does not appear to be very rare. As yet there is no indication of it in Oregon and Washington, or in Vancouver Island.

In the Old World *R. acicularis* extends perhaps farther north, but it extends less towards the south than in America.

ROSA GYMNOCARPA Nutt.

R. gymnocarpa Nutt. presents an appearance and distinctive characters which never permit it to be confused with any other American species. Its stem, branches, and floriferous branchlets are habitually clothed with scattered prickles which are very slender, setaceous and very numerous; only in rare cases are the branches and branchlets entirely unarmed. In vigorous and slender bushes, at the extremity of the axes the prickles become more sparse and beneath some leaves appear more or less regularly paired; but that is a simple accident which may happen in the other CINNAMOMEÆ with normally scattered prickles.

Its leaflets are remarkably thin, with teeth richly glandular-compound, the lower surface glabrous and the midrib with quite large glands, which very rarely extend to some of the lateral veins. As to their form and dimensions, the leaflets are very variable; they are very small or quite large, elliptical, oval-elliptical, oval, or oval-suborbicular; the base is often rounded, and quite rarely attenuate.

Watson has described, under the name of variety *pubescens*, some specimens obtained in the Sierra Nevada by Asa Gray, and in Silver mountains by Brewer. It is really that form with finely pubescent leaves. Does it appear specifically distinct from *R. gymnocarpa?* Not having seen it I am not able to express a competent opinion upon it, as upon another form observed by Watson in Montana with corolla two inches in diameter instead of very small.

In *R. gymnocarpa* the inflorescences are habitually one-flowered, rarely many-flowered. The corolla is remarkably small, its diameter not exceeding 20^{mm}. The very slender pedicels are often glandular-hispid, more rarely smooth.

As yet I have always seen the receptacles smooth, but they may be expected to be sometimes glandular-hispid. The fructiferous ones are generally very small, habitually ovoid, rarely globular, and produce a very small number of akenes.

This species presents a character peculiar to it, at least in America. The receptacles, before complete maturity, are cut off

by an articulation towards the summit, permitting the calyx to detach itself in one piece, leaving the receptacular cavity open. This singular articulation, which is constant, also occurs in two Asiatic species of the same section of CINNAMOMEÆ, *R. Beggeriana* Schrenk and *R. Alberti* Regel.

Watson includes in the geographical range of *R. gymnocarpa* British Columbia, Washington and Oregon, and all of California to the latitude of Monterey. He expresses doubt as to the existence of the species as far south as San Diego. Lastly, he also includes in the range northern Idaho and northwestern Montana. With the exception of Montana I have received numerous specimens representing the different regions cited by Watson. The northernmost station from which I have received specimens is situated in 55° lat. These were obtained by Mr. Meehan. I should add, in passing, that I can confirm the exactness of the mention by Mr. Holzinger (*loc. cit.*) concerning northern Idaho. According to the facts thus far recorded the distribution of *R. gymnocarpa* appears to be occidental, and does not extend very much towards the east.

As can be seen from the above remarks, there remain many researches to be made and points to be established before arriving at a complete acquaintance with the genus *Rosa* of western North America. When it is known how much research the roses of the Alps have demanded, it should be expected that the immense extent of the Sierras and Rocky mountains would in their turn demand an equal amount of investigation.

It is reasonable to suppose that these American regions have not yet disclosed all their rhodological riches; and that there will be discovered there unpublished types. Perhaps many such are already in herbaria, but confused as varieties of species already known.

Among the readers of the above paper who desire to cooperate in the work to which I urge American botanists perhaps there may be found those who shrink from the task of extracting from my notes anything essential or practical for the distinction

of species. For their benefit I have prepared an analytical key or dichotomous table. In it I will not include species of the section CAROLINÆ, or *R. setigera* Michx., which belongs to the section SYNSTYLÆ. I will confine myself to the CINNAMOMEÆ, including with them *R. minutifolia* Engelm., from Lower California, which constitutes by itself the monotypic section MINUTIFOLIÆ.

ANALYTICAL KEY TO THE ROSES OF THE WESTERN STATES.

1 Inflorescences always one-flowered, without bracts; exterior sepals appendiculate from the base, with the appendages incised or denticulate; leaflets incised; receptacles with long silky pubescence - - - - - *R. minutifolia* Engelm

Inflorescences one or many-flowered; pedicels with one or more bracts; exterior sepals entire or with one or two small entire and erect appendages at the summit; leaflets toothed; receptacles smooth or clothed with pedicellate glands - - 2

2 Flowering branchlets more or less setigerous, with scattered setaceous prickles - - - - - - - - - - 3

Flowering branchlets unarmed - - - - - - 7

Flowering branchlets with regularly paired prickles under the leaves - - - - - - - - - - 11

3 Corolla very small (15 to 20^{mm} in diameter); calyx detaching itself in a single piece during ripening, leaving the receptacles open at summit; akenes not very numerous; leaflets thin, glabrous, with glandular compound teeth - *R. gymnocarpa* Nutt.

Corolla usually much exceeding 20^{mm} in diameter; sepals erect upon the fructiferous and persistent receptacles - - 4

4 Inflorescences ordinarily one-flowered; leaflets oval, broadly rounded at base, with glandular compound teeth *R. acicularis* Lindl.

Inflorescences usually many-flowered; leaflets often more or less attenuate at base, with teeth usually simple - - - - 5

5 Corolla rather small (about 30^{mm} in diameter); leaflets oval-elliptic; sepals silky outside; stipules and bracts strongly denticulate - - - - - - *R. gratissima* Greene

Corolla rather large; leaflets obovate, strongly narrowed or cuneate at base; bracts usually entire - - - - - - 6

6 Annual stems often transformed into false flower-bearing branchlets with leaves 9 to 11-foliate, or normal flowering branchlets densely setigerous - - - - *R. Arkansana* Porter

Annual stems not transformed into false flower-bearing branchlets; normal flowering branchlets with prickles more or less rare *R. blanda* Ait.

7 Corolla very small (15 to 20^{mm} in diameter); calyx detaching itself in a single piece during ripening, leaving the receptacle open at summit - - - - *R. gymnocarpa* Nutt.

Corolla more than 20^{mm} in diameter; sepals erect upon the fructiferous and persistent receptacles - - - 8

8 Upper stipules and bracts narrow; sepals usually silky outside, *R. Californica* Cham. & Schlecht.

Upper stipules and bracts more or less large; sepals not silky 9

9 Upper stipules and bracts much dilated; inflorescences often one-flowered; corolla usually large; fructiferous receptacles large, remaining quite dry at maturity, with large akenes; leaflets often glandular beneath and with glandular compound teeth *R. Nutkana* Presl

Upper stipules and bracts moderately dilated; inflorescences often many-flowered; corolla quite small or middle-sized; fructiferous receptacles small or middle-sized; leaflets usually without glands beneath, and with simple teeth - - - 10

10 Leaflets oval, more or less rounded at base, with open teeth; fructiferous receptacles often small; corolla quite small *R. pisocarpa* A. Gray

Leaflets obovate, narrowed or cuneate at base, with teeth, directed toward the apex; fructiferous receptacles large or middle-sized; corolla quite large - - - *R. blanda* Ait

11 Paired prickles with tips more or less curved or hooked; upper stipules and bracts narrow; receptacles nearly always smooth *R. Californica* Cham. & Schlecht.

Paired prickles straight; upper stipules and bracts more or less dilated, rarely narrow - - - - - 12

12 Bushes very small, a few inches in height and not surpassing a foot; upper stipules and bracts narrow; corolla very small, not exceeding 20^{mm} in diameter; receptacles often glandular-hispid - - - - *R. spithamæa* Wats.

Bushes not very small; upper stipules and bracts more or less dilated; receptacles rarely glandular-hispid - - 13

13 Paired cauline prickles stout, more or less triangular, with straight tips; upper stipules and bracts much dilated; leaflets often with glandular compound teeth; inflorescences often one-flowered; corolla usually very large; fructiferous receptacles large and with large akenes, rarely glandular-hispid

R. Nutkana Presl

Paired cauline prickles not stout, slender or quite slender; upper stipules and bracts moderately dilated; leaflets usually with simple teeth; inflorescences usually many-flowered; corolla middle-sized or small; fructiferous receptacles small or quite small - - - - - - - 14

14 Stipules and bracts quite deeply denticulate; foliar teeth directed towards apex; sepals more or less silky outside

R. gratissima Greene

Stipules and bracts entire; foliar teeth quite open; sepals not silky - - - - - *R. pisocarpa* A. Gray

BRUSSELS, BELGIUM.